

(12) UK Patent Application (19) GB (11) 2 310 562 (13) A

(43) Date of A Publication 27.08.1997

(21) Application No 9608469.4

(22) Date of Filing 25.04.1996

(30) Priority Data

(31) 9604246

(32) 26.02.1996

(33) GB

(51) INT CL⁶
H04M 1/02

(52) UK CL (Edition O)
H4J JK J36Q

(56) Documents Cited

GB 2235606 A EP 0588210 A1 WO 95/03642 A1

(58) Field of Search

UK CL (Edition O) H4J JAAB JK
INT CL⁶ H04B 1/38 , H04M 1/00 1/02 1/03 1/60 1/62
1/72 , H04Q 7/32

ONLINE: WPI, JAPIO, CLAIMS

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(54) Function of permanently exposed key depends on cover position

(57) A radio telephone with a sliding cover 3 that moves between positions concealing and revealing a plurality of keys. Predetermined functions are performed in response to respective sequences of actuations of the plurality of keys. The position of the slide affects the function of at least one other key 16 which is never concealed by the slide.

The never-concealed key 16 may operate a hook switch or adjust loudness.

Fig.3.

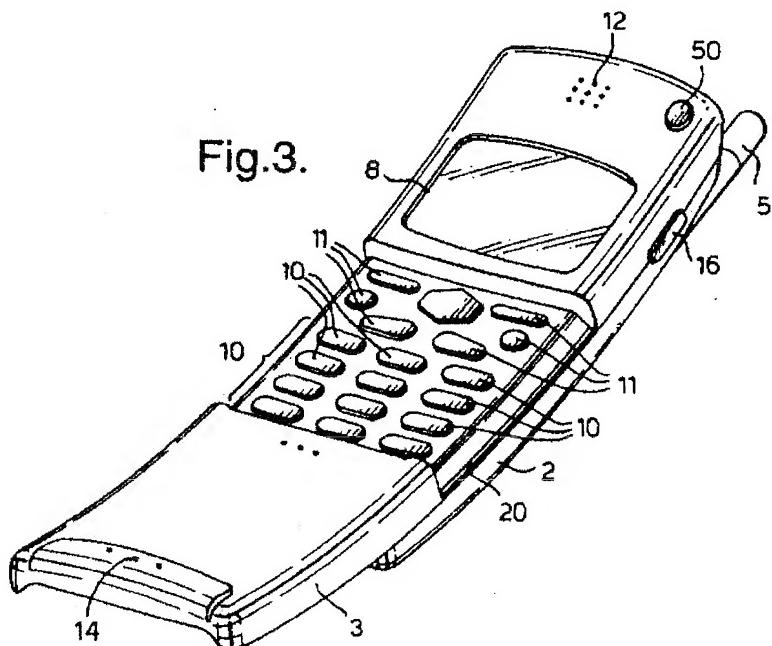


Fig.2.

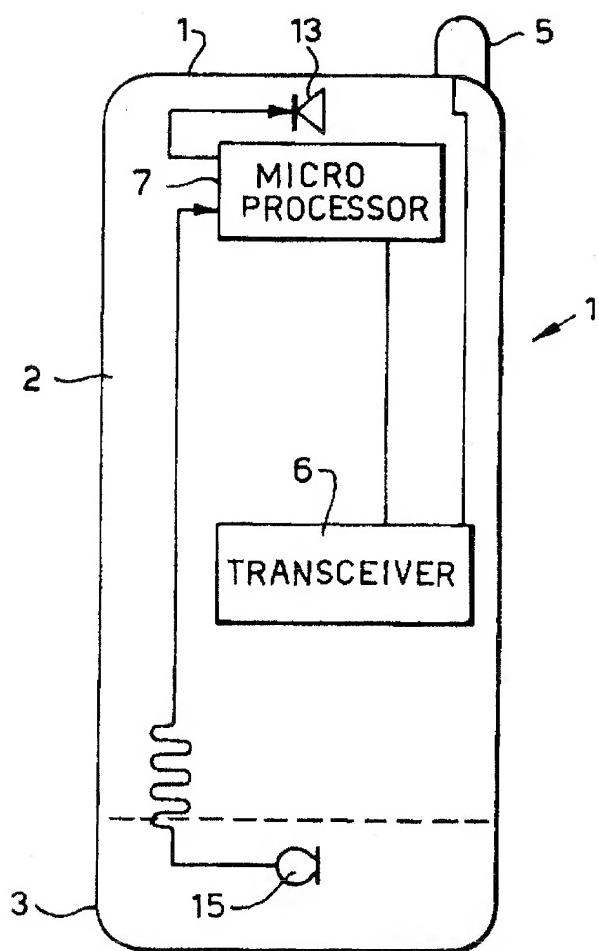


Fig.6.

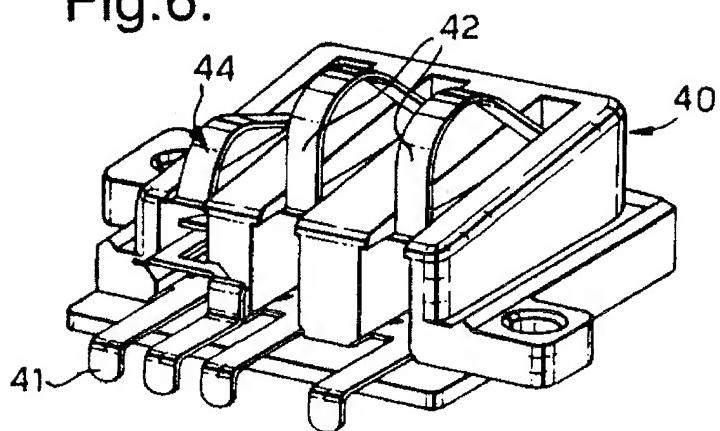


Fig.7.

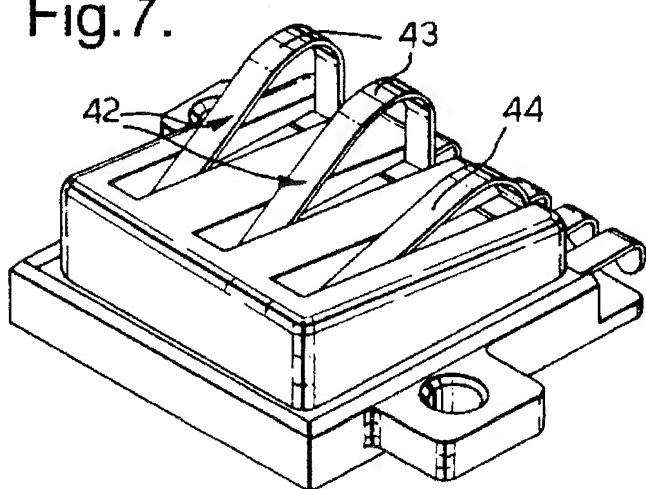


Fig.8.

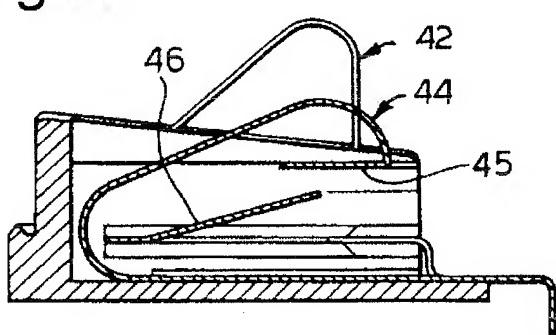


Fig.11.

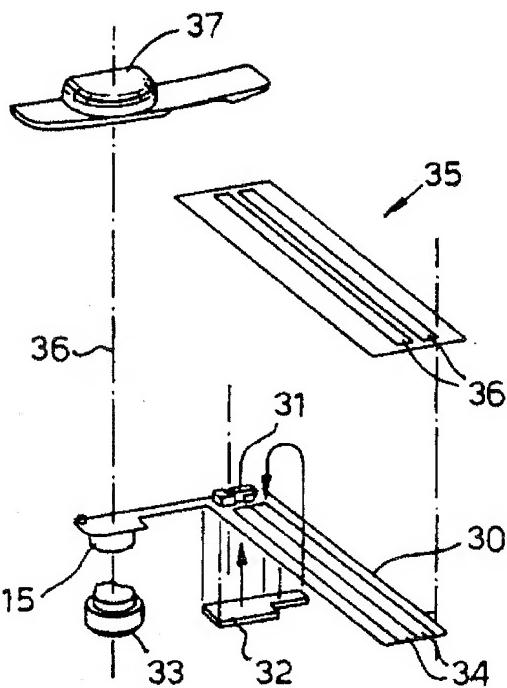
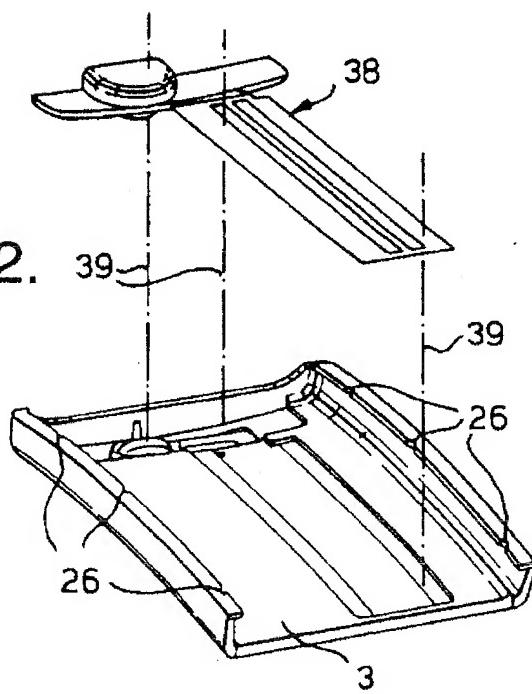


Fig.12.



In the handset described in EP 0 414 365 the connection enabling the call answer/send mode is only made when the cover portion is in its fully extended position. Hence the handset can only be used for making or answering a call when the cover is in its fully extended position.

In accordance with the present invention there is provided a portable telephone comprising a set of keys; a cover portion movable between a first position covering the set of keys and a second position not covering the set of keys; and a further key not covered by the cover portion in either position, which has a first function when the cover is in the first position and a second function when the cover is in the second position.

The first function and the second function are suitably different. Both functions preferably include causing the telephone to perform one or more actions, preferably dependent on the status and/or configuration of the telephone. Preferably, at least one, and most preferably both, of the first and second functions includes causing the telephone to perform at least one action that is not part of the other function.

The first function preferably includes putting the telephone in an off-hook condition, suitably to answer incoming calls detected by the telephone. The first function preferably includes putting the telephone off hook only during the period when an incoming call is detected. The first function may also include volume control, suitably ringer volume control and preferably only whilst an incoming call is not detected.

The second function preferably does not include putting the telephone in an off-hook condition; suitably at least not whilst an off-hook key of the set of keys is exposed. The second function may include volume control, suitably ringer volume control.

is in the first and second positions and positions intermediate the first and second positions. The first transducer is typically a speaker or ear piece and the second transducer a microphone. The portable telephone is suitably a portable radio telephone.

Movement of the cover from the first position preferably causes a call to be answered. Movement of the cover to the first position preferably causes a call to be terminated. This provides the user with options other than actuation of keys for answering and terminating calls.

By enabling the handset to be placed in the off-hook condition in the first and second positions and at least one intermediate position, answering a call is not unduly restricted by the position of the cover. This again simplifies operation of the handset.

The invention will be described in more detail, by way of example, with reference to the accompanying drawings, in which:

figure 1 is perspective view of a portable radio telephone handset in accordance with the present invention with the slide cover closed;

figure 2 is a schematic representation of a radio telephone handset;

figure 3 is a perspective view of the portable radio telephone handset of figure 1 with the slide cover fully open;

figure 4 is a perspective view of the portable radio telephone handset of figure 1 with the slide cover in an intermediate position;

figure 5 is partial perspective view of the main body of the portable radio telephone handset of figure 1 with the slide cover removed showing the microphone connector;

redial, call start (e.g. labelled SEND) etc., again as is usual. The "key" could be a key or button or any element for providing input to the microprocessor, preferably input from a user and preferably by means of contact with and/or pressure on and/or touching of the key. The display panel, LCD 8 is located on the housing above the two groups of keys. Above the display is located a series of holes 12 behind which is an earphone or speaker 13 for transmitting speech or other sounds to the user of the radio handset. The sleeve has a series of holes 14 at its lower end behind which are mounted a microphone 15 (figure 2).

The sleeve portion 3 is arranged to slide relative to the main body between a closed position illustrated in figure 1 and a fully open position illustrated in figure 3. The main body of the housing is curved and the sleeve-like portion provides a curvature sufficient for the ear 13 and mouth 15 pieces to be positioned respectively adjacent the ear and mouth of the user. The material chosen for the slide of this particular embodiment of the invention is a polycarbonate with added teflon to provide a satisfying sliding feel when in use.

In the closed position, both groups of keys 10,11 are concealed (figure 1); the only key available for use being a multi-purpose key 16 positioned on the side of the handset. In the fully open position (figure 3) both groups of keys 10,11 are revealed allowing both numerical and control keys to be selected. A third sleeve position is illustrated in figure 4 in which the sleeve is partially open showing only the second group of keys 11. In this position the control keys can still be selected but the numeric keys cannot as they are concealed. Calls can be made using the control keys, i.e. calls from memory, and calls can be taken. In this embodiment it is the physical concealment of the keys, with the wall of the sleeve portion interposed between the keys and the user, that prevents them from being used. In other embodiments (not illustrated) it could merely be the interposition of a barrier which does not conceal the keys but covers them at least enough to prevent fingers reaching them that prevents the keys from being used. For example, the barrier could have small holes in it.

In the embodiment described, the arrangement of the groups of keys is such that in particular positions the sleeve provides access to the respective groups. It is desirable, therefore, that there is a preference for the sleeve to be located in positions revealing either neither the first nor the second set of keys (closed) (figure 1), the second set of keys alone (intermediate), (figure 4) or both the first and second sets of keys (fully extended) (figure 3). The third set of keys i.e. (in this embodiment) the multipurpose key 16 is revealed at all times.

In order to hold the sleeve in the three preferential positions the main body of the handset is provided with a pair of members 22 (figures 5,10) located within the main body that protrude one into each of the grooves 20 located on the main body 2 of the handset. The members 22 are spring loaded to allow the sleeve portion to move from the preferred positions when desired. The member 22 is resilient and mounted in a holder 24 inside the main body 2 with a detent 23 that protrudes through an aperture 25 in the groove 20. The detent 23 is depressed so that it no longer protrudes into the grooves 20 by one of the runners 21 of the sleeve portion 3. The runners are provided with recesses 26 (figure 9), when a recess 26 coincides with a detent 23, the sleeve 3 is held in position. The recesses 26 are provided so that the sleeve portion is 'caught' in the closed, intermediate and the fully open positions.

Two of the recesses 26 in the runners 21, those corresponding to the closed and intermediate positions have cammed edges so that when extra force is provided to slide the sleeve from the first two sleeve positions, the detent 23 is depressed below the surface of the bottom of the groove 20 for disengagement from the recess 16 allowing the sleeve portion 3 to continue to slide in the chosen direction. The recess corresponding to the intermediate position will have cammed leading and trailing edges to allow movement in either direction. The recess corresponding to the closed position may only have a cammed leading edge to allow for ease in opening.

microphone 15 is located behind the holes 14 at the bottom end of the slide connected to the two slide tracks

A microphone connector 40 is mounted on the main body of the handset suitably by ultrasonic welding (figure 5). The connector is positioned so that it is in electrical contact with the main PCB in the body of the handset by contacts 41 or other mechanism. It is positioned to make contact with the two slide tracks at all positions of the sleeve for provide an electrical connection between the microphone and the main processor of the handsets. As the microphone is in electrical contact with the main processor via the slide tracks at all times the signals from the microphone can be utilised in the main processor when appropriate for incoming or outgoing calls. The connection is also maintained during movement of the sleeve portion. The handset can, therefore, be used to the extent that the relevant keys are exposed in all positions of the sleeve relative to the main body. The microphone connector can be seen in greater detail in figures 6 to 8.

The microphone connector 40 comprises two spring contacts 42 disposed for contact with respective ones of the two slide tracks. The bearing surfaces 43 of the spring clip are flattened to provide for improved contact with the slide tracks. The spring loading of the contacts ensures good electrical contact between the microphone and microprocessor for a range of distances between the sleeve portion and main body at the microphone connector element. This provides for a good degree of tolerance for the manufacturing process. It also allows the sleeve to be at different distances from the microphone connector for respective positions of the slide.

For reliability is it desirable that the electrical connection between the microphone connector and the slide tracks is hard wearing and resistant to dirt or other damage. In this particular embodiment the connectors are plated with 20 microns of palladium nickel followed by 2 microns of hard gold. The slide

pressing any of the exposed keys other than the power key 30, including the multi-function key. When the sleeve portion of the handset is fully open any one of the available keys can be used to answer a call. In the second 'any-key answer' mode the multi-purpose key does not answer a call if the slide is open.

When in either 'any key answer' mode, or in the telephones normal answer mode, if the sleeve is closed there are two exposed keys, the multi-purpose key 16 and the power control key 50. The handset can be closed and powered up or closed and powered down. If the handset is powered up it is in standby, i.e. in condition to receive calls. If the handset then receives a paging message indicating that there is an incoming call for the handset, the call can be answered in two ways, either by actuating the volume control key or by sliding the sleeve from the closed position. The microprocessor uses the signal from the microswitch to determine that the sleeve is in the closed position. Any signal received from the multi-purpose key when the sleeve is closed can accordingly be utilised to receive an incoming call. Likewise, with the microswitch indicating that the sleeve is closed, moving the sleeve from the closed position causes the microswitch to indicate this displacement to the microprocessor 7. This signal can also then be used to place the handset in the off-hook condition for receiving an incoming call.

A call can be terminated by pressing the end key, provided it is exposed or closing the sleeve. The microphone and earpiece are connected to the microprocessor for all positions of the slide and the keys are continually polled to determine if they have been actuated.

The present invention includes any novel feature or combination of features disclosed herein either explicitly or any generalisation thereof irrespective of whether or not it relates to the claimed invention or mitigates any or all of the problems addressed.

CLAIMS

1. A portable telephone comprising:
a set of keys;
a cover portion movable between a first position covering the set of keys and a second position not covering the set of keys; and
a further key not covered by the cover portion in either position, which has a first function when the cover is in the first position and a second function when the cover is in the second position.
2. A portable telephone as claimed in claim 1, wherein the first function includes putting the telephone in an off-hook condition.
3. A portable telephone as claimed in claim 1 or 2, wherein the second function does not include putting the telephone in an off-hook condition.
4. A portable telephone as claimed in any preceding claim, wherein the function of the further key includes putting the telephone in an off-hook condition only when the cover is in the first position.
5. A portable telephone as claimed in any preceding claim, wherein the function of the further key depends on whether an incoming call is detected by the telephone.
6. A portable telephone as claimed in any preceding claim, wherein the first function and/or the second function include volume adjustment.
7. A portable telephone as claimed in any preceding claim, wherein if an incoming call is indicated actuation of an exposed key places the handset in the off-hook condition.



The
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Application No: GB 9608469.4
Claims searched: 1 to 10

Examiner: Peter Easterfield
Date of search: 9 July 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4J (JAAB, JK)

Int Cl (Ed.6): H04B 1/38; H04M 1/00, 1/02, 1/03, 1/60, 1/62, 1/72; H04Q 7/32

Other: Online: WPI, JAPIO, CLAIMS

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2235606 A (TECHNOPHONE)	
A	EP 0588210 A1 (HITACHI)	
A	WO 95/03642 A1 (MOTOROLA)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.